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Factors of the marketing macro system effecting children's food production

Abstract. The article reveals unsettled reasons of changing in the children's food market. Various political, economic, demographic, sociological, natural, and technological forces are extensively used in the paper to examine the external influence on the market. The aim of the research is a consequent evaluation of children's food production factors on the macro level of the vegetable market. The novelty of the study explains the research methodology which is based on a factor analysis of a marketing system influence on the macro level. The study presents a quantitative expert evaluation of the main factors in the vegetable market. We use the total integer indicator to study a degree of influence both in complex and separately. An improved methodology is outlined in three sections. The first section gives an overview of marketing forces at the macro level. The second section examines the most significant negative and positive factors in the complex. Finally, our propositions for market development are drawn in the final section. It is suggested that economic, demographic and socio-geographic factors affect mostly at the macro level. Calculation of total threats and opportunities in factor groups proves a negative tendency in the development of enterprises which offer vegetable products for children. Based on the factors grouping results, the authors propose further alternative strategies for marketing development in vegetable enterprises such as Internet purchasing and upgraded food canal chain management.

Keywords: Marketing Macro System; Marketing Factors; Vegetables Producers; Children's Food; A Total Integer Indicator
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Фактори маркетингового зовнішнього середовища, що впливають на виробництво продуктів дитячого харчування

Анотація. У статті розкриваються неврегульовані причини зміни маркетингового середовища на ринку продуктів дитячого харчування. Мета дослідження – послідовна оцінка факторів зовнішнього маркетингового середовища ринку овочів, які пропонуються для дитячого харчування. Обґрунтовується, що на макрорівні основними факторами є економічні, демографічні та соціально-географічні. Обчислення загроз і можливостей у групах факторів свідчить про негативну ринкову ситуацію для розвитку підприємств із виробництва овочевої продукції для дітей. Ґрунтуючись на результатах групування чинників, автори пропонують додаткові альтернативні стратегії розвитку маркетингу на овочевих підприємствах, такі як Інтернет-закупки й модернізація логістики продуктів харчування.

Ключові слова: маркетингове макросередовище; маркетингові чинники; виробники овочевої продукції; дитяче харчування; загальний інтегральний показник.

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Факторы маркетинговой внешней среды, влияющие на производство продуктов детского питания

Аннотация. В статье раскрываются неурегулированные причины изменения маркетинговой среды на рынке продуктов детского питания. Цель исследования – последовательная оценка факторов маркетинговой внешней среды рынка овощей, которые предлагаются для детского питания. Обосновывается, что на макроуровне основополагающими факторами являются экономические, демографические и социально-географические. Вычисление угроз и возможностей в группах факторов свидетельствует о негативной рыночной ситуации для развития предприятий по производству овощной продукции для детей. Основываясь на результатах группировки факторов, авторы предлагают дополнительные альтернативные стратегии развития маркетинга на овощных предприятиях, такие как Интернет-закупка и модернизация логистики продуктов питания.

Ключевые слова: маркетинговая макросреда; маркетинговые факторы; производители овощной продукции; детское питание; общий интегральный показатель

1. Introduction

Demographic and economic crises cause a negative effect on consumer behavior in Ukraine, especially in the market of children's food. Low product quality, high prices, seasonality of demand and unbalanced provision are considered to be the major problems of inefficiency in marketing. In Ukraine, the five-year social program of product development of children's food has been effective only till 2016 (The Cabinet Decree of Ukraine, 2011) [1]. It means that the government does not support any strategy of financial investments, technology updates and improving quality, which were the core objectives of previous programs. It forces domestic companies to conduct business in an unpredictable market environment. However, a directive of the European Commission on the primary food for infants and young children creates a framework of quality detection and strategies for supporting entrepreneurship. This makes entry to the European vegetable market quite attractive for Ukrainian entrepreneurs (Commission Directive 2006, 2009) [2, 3]. Since vegetables are an important source of vitamins and other nutrients, they are indispensable for children's nutrition. Companies in a vegetable market, as in any market, are influenced by factor groups at both the micro and macro levels. Notwithstanding that each of the factors can have both negative and positive impacts, the problem is to quantify such an influence and find possible choices for effective marketing. Food consumption is attracting widespread interest due to increase in the birth rate in Ukraine. Because of the absence of a governmental program for supporting children's food quality, marketing forces are set to become an important component affecting children's food markets.

2. Brief literature review

The great majority of researchers based their results on determining the influence according to the Kotler's marketing environment (1967), which contains the macro and micro levels [4]. It is noticed that the macro level includes demographic, economic, natural, technological, political and cultural forces.

Globalization of marketing forces enterprises to wide their distribution area and develop new business relations. From this point of view, Birnleitner (2013) further developed Kotler's forces according to cross-cultural differences and influences on the multinational integration process [5]. It led him to select the political and legal forces to explain their influence on the marketing environment. Birnleitner's conclusions seem to be reasonable in order to include the political environment of new countries in multicultural market integration. Samnani (2014), an expert in fast food marketing, mentions that law enforcement plays an important role in political pressure on certain companies and holdings [6]. Therefore, political factors have to be analyzed in further research of the food marketing environment. Moreover, Samnani's investigation of the cultural forces focused on «views of oneself and the Universe». He claims that today's people are concerned about their health and religions of others. These forces create a new societies' basic value when stores offer a choice of nutrition and organic food, halal, kosher and vegetarian products. A variety of factors has contributed to the increase in organic food consumption. A group of researchers (Baker, Thompson & Engelken, 2002) has conducted interviews to develop a value map of organic vegetable and fruit consumption [7]. They came to the conclusion that the main reasons why people buy the organic version are related to health and enjoyment of life. However, when more countries are covered by the research more social factors appear. Research of the attitudes of organic consumers by Aertsens et al. (2009) shows that style of life may play no important role in one country, whereas it is more relevant in others [8]. Nevertheless, there is a particular consumer in every region and country. Squire's group (2001) comes to the conclusion that females are the main consumers of organic food because of their interest in diet [9]. This suggests that future mothers would choose nutrition products for infants based on their comparing various types of products. When consumers buy a meal at a supermarket they chose ostensibly between fresh fruits and sweet snacks (Wansink & Sobal, 2007) [10].

In contrast, children's food has to contain a nutritious complex of vitamins and to be sugar-free. For example, green leafy vegetables are a relatively affordable product to replenish vitamin A and trace minerals for children (Block et al., 2004) [11]. Developing next-generation nutrition products for children's food should be part of a lifestyle.

Numerous academic researchers detect today's huge influence of Internet websites and online commercials in marketing communications. Keller (2001, 2009) claims that changing Internet environment significantly influences branding of any company [12-13]. If a company is not known online, it does not have a strong brand and it could lose potential customers, as he says. From this point, Hughner's group (2007) comes to the conclusion that people do not know the main advantages of organic food because of insufficient Internet marketing [14]. Constantinides (2006) traces the advances in the evolution of a marketing system since Internet market was developed [15]. In order to define an impact of a new domain marketing factor, he draws options of E-marketing and web public companies.

These studies tend to focus on positive and negative distribution factors which could be implied by a company rather than the full influence of groups. This presents a disadvantage in researching the marketing environment. The papers might have been more convincing if they described the relationship between factors more widely.

Previous studies only focused on the explanation of various groups of marketing forces such as economic, demographic and natural factors. But the results of these studies could not be implemented entirely because these patterns of factors do not take into account the features of a product. Unfortunately, it does not explain specific conditions of the vegetable market. For instance, perishable and seasonal qualities of vegetables are supposed to be the main attitudes of natural factors, while vitamin content is considered to be a relevant requirement for consumers. One more question that needs to be raised is how the marketing environment influences the behavior of mothers to buy children's food. There is still considerable uncertainty with regard to particular properties of vegetable consumption by children. However, despite this gap in our knowledge, no studies addressing factors influencing the vegetable market of children's food have been conducted to date.

A key problem with most of the methodology of the factor analysis is that authors develop a list of factors and do not study the interaction between them. This had led researchers such as Moroz & Lebid (2009), Levkiv & Leskiv (2010) to review marketing forces qualitatively without any mathematical evidence [16-17]. The scientific approach to these studies is not suitable. In contrast, Starostina's methodology (2012) of macro and micro analysis is fully justified by practice [18]. It is tested on a marketing research of domestic and international markets. Further research is conducted by Kulish (2016) who uses this approach to analyze marketing effects on the dairy market [19]. The minor deficiency of her study is that it does not entail a total evaluation of factor complex on a macro or micro level. Therefore, the research presented in our article will be based on the Starostina's research methodology with modification (2012) [18].

3. Purpose

This paper is reporting the results of a study of the vegetable market. We improved the methodology using an example of children's food consumption factors. The aim of the research is a consequent evaluation of children's food production factors on the macro level of the vegetable market. An improved methodology is outlined in three sections. The first section gives an overview of marketing forces at the macro level. The second section examines the most significant negative and positive factors as a complex. Finally, our propositions and alternatives for market development are drawn in the final section.

The subject of the research is a theoretical approach to a marketing environment study. The objects of the study are the conditions of entrepreneurs marketing activity on the infant vegetable food market.

The novelty of the article is explaining improved methodology of the macro marketing environment study using the example of the vegetable food market for children's consumption.

4. Methods

The analysis of factors is based on the methodology of Starostina (2012); however, it further develops a comparison and evaluation of factor groups which made alternatives more applicable [18]. Political, economic, demographic, sociological, natural, and technological forces are considered to be the main parameters of the macro environment. For the limited space reason, the microenvironment is not evaluated in the paper, and will be considered in further research. In order to evaluate an influence rate of groups of macro environment, we examine both the macro and the micro level as a whole.

We conducted a survey of twelve marketing experts from leading Ukrainian enterprises and research services in order to explore the marketing environment in a more reasonable way. We conducted survey in May, 2018 using e-mail and phone conversation. We have asked professionals from various firms: Ukrainian Horticulture Development Project (a project manager), Melitopol Consulting Center «Agro-Tavria» (two advisors), National Scientific Center «Institute of Agrarian Economics» (two senior scientists), farmers who produce vegetables in the South part of Ukraine (two farmers), Tavria State Agrotechnological Universitiy (two professors), a local producer of vegetables for children in Zaporizhzhya region (one producer), national supermarket net «Silpo» (two categories of managers). They were asked to fill an interview form and evaluate all factors on a scale from 1 to 10 points ranging from a weak (1 point) to strong (10 points) influence. At the first step, we proposed experts to evaluate the ratings of each group both at the macro and micro levels. Secondly, they should have completed a list of factors of other necessary determinants that were not included in a draft. Finally, interviewed experts examined each factor separately to crea_te their individual factor influence.

We designed an adapted equation of factors investigation, which included an influence rate of each factor group and average estimation of each factor. The graduate change in factors was observed in order to compare a measure of enterprise opportunities and threats at the macro and micro level:

$$I_{er} = I_{erM} + I_{erm} \rightarrow max\,, \tag{1}$$

$$I_{erM} = \left(\sum_{i=1}^{n} Eo_i \times R_f\right) - \left(\sum_{i=1}^{n} Et_i \times R_f\right), \tag{2}$$

$$\sum_{f=0.01}^{0.99} R_{f=1}\,, \tag{3}$$

where:

i is a factor of macro environment;

n is quantity of factors;

f is a group of factors;

I_{erM} is an indicator of n factors influence in macro environment according to rate of factors' group;

I_{erm} is an indicator of n factors influence in micro environment according to rate of factors' group;

R_f is a rate of f^{th} group of factors;

Eo_i is opportunity estimation of i^{th} factor in macro environment;

Et_i is treat estimation of i^{th} factor in macro environment.

The equations (1) demonstrate the level of total indicators of macro and microenvironments, equations (2) explain the total positive and negative effect on food production in the macro environment. To sum it up, a total integer indicator should strive for a maximum.

5. Results

All things considered emphasize that nutritious children's food contributes to the nation's health in the future, while environmental pollution causes a negative healthy children's development. Nutrients, safe packaging, high quality fresh fruits and vegetables, standardized processing, and storage are supposed to be the main options for a perfect product for a child if these options meet all necessary market requirements. From this point of view, not only a consumer makes a decision, because he or she is forced by producers through advertisement, by healthcare professionals through consulting, and by a government through legal regulations.

Unless enterprises do not propose various children's product, mothers cannot select a health and nutrition type or sort for her child. Nowadays, only two canneries offer fruit and vegetable juices and canned products in Ukraine, such as Odessa Baby Food Factory and Association of Baby Food «Karapuz». Association of Baby Food «Karapuz» produces 16 fruit and vegetable purees, 9 fruit and vegetable juices and 5 fruit nectars. Odessa Baby Food Factory specializes on 25 fruit and vegetable purees and 18 fruit and vegetable juices. Their structure of distribution sales consists of 85 and 45% of products for children [20]. Moreover, different local enterprises produce foods for children to supply it in a region. Unfortunately, such companies do not have competitive forces and volume of production to distribute it in the national trade nets and develop their own brand. Such companies depend financially to maintain modern technologies and meet world standards of quality production.

In Ukraine in 2017 canned products and juices had 8.2% and 12.8% in consumption structure. Actually, in 2017 total Ukrainian production of fruit and vegetable canned products for children was 29.3 thousand tones and 5.7 thousand tons of juices. During the last five years, the volume of production went up for 5.0 and 3.3 thousand tons respectively. However, the share of export of children product increased for 20% during 2013-2017 and reached 79.5% [21]. Export of baby food to Ukraine is largely based on proposition of world famous brand Nestle which makes Ukrainian producers not competitive by price and technologies. For example, the prime world producer of children production Nestle offers its products using various brands such as Organic Big Gerber and Gerber. Reducing of market share for Ukrainian factories means the lack of the part of their consumers and rising of price competition. Nevertheless, widening of the global marketing opens opportunities to expand marketing domain using the Internet and social nets.

It is unfair not to mention that in the global world, the Internet swiftly complements a group with an opinion of social networks. Internet usage leads to changes of consumer behavior because they can get new knowledge about food value, its composition, and preferable ways of using the product. Moreover, producers of children food benefit additional international suppliers and customers, surfing the Internet. In such a way, they can get a more favorable position in the children's food market through activating extra advantages from social and international factors.

For simplicity, we did not consider the dependence of other factor groups (ecological, behavioral, etc.) because they are parts of the natural or social-geographic complex. Only a complex evaluation gives an opportunity to develop a ground strategy based on benefits from opportunities and alternatives from threats.

We combine the influence of all market players in groups of factors, and examine their influence rate using pair comparison of all groups (Table 1).

In spite of huge political and legal pressure on economic activity in Ukraine, it was estimated as one with a low influence rate by interviewers. The group of political factors equals only 0.05 points because competitive development of any market is claimed to generate without total government regulation.

Tab. 1: **Impact level of factors at Macro and Micro environment**

Group (Factor)	Group influence rate (R)
A group of factors at Macro environment	
Politics and government state	0.05
Economics	0.15
Demography	0.15
Socio-geography	0.05
Nature	0.05
Technology	0.1
A group of factors at Micro environment	
Competitors	0.1
Suppliers	0.05
Consumers	0.15
Intermediaries	0.1
Publics	0.05
Total	**1.00**

Source: Compiled by the authors according to the expert survey

To compare with other aspects of market determinants, the groups of some factors are not actually valid for consumption of children's food. From this point of view, groups of the following factors: socio-demographic, natural, suppliers, and public have the lowest estimation. On account of the expert's opinions, we made an assumption that the economic and demographic situation plays an essential role in any children's market, not only a food market.

We have obtained comprehensive results showing the legal pressure on production of children's food (Table 2).

Support of consumers regulated by Ukrainian laws is considered to be the main advantage from regulated factors. For instance, the Law of Ukraine «About the consumer's right protection» ensures consumers right with regard to quality and product safety, while suppliers can get essential information about quality, quantity, assortment, and a place of production (The Law of Ukraine, 1991) [24].

Moreover, the law guarantees that producers and suppliers have to meet requirements of necessary supply chain management. An average estimation of this factor is 5. The influence on children's market by this law would be evaluated higher by experts if this law included some regulations for children's food production.

The most influenced positive state regulation, evaluated by experts at 8 points, occurs under the Law of Ukraine «About the main principles and requirements for safety and quality of food» (The Law of Ukraine, 1997) [22]. The law presents theoretical basics about safety of food products, food components, nutritional supplements, and ingredients. This law is claimed to conform to norms and standards of the European Union; so Ukrainian producers have the potential

Tab. 2: **A group of political factors in Macro environment (influence rate R = 0.05)**

Factor	An average estimation	Integer indicator
Opportunities		
The main provisions of food safety and quality according to the Law of Ukraine «About the main principles and requirements for safety and quality of food» [22]	8	0.4
Ensuring a minimum of production under market requirements according to the Law of Ukraine «About food security of Ukraine» [23]	7	0.35
Ensuring qualified customer service according the Law of Ukraine «About the consumer's right protection» [24]	5	0.25
Total evaluation		**1.0**
Threats		
Political instability in the country	6	0.3
Partial compliance to international food quality standards according to the Codex Alimentarius and HACCP	9	0.45
Regulating legal relations between producers, traders and consumers during production, purchasing, transportation, and consumption according to the Law of Ukraine «About quality and safety of food» [25]	7	0.35
Total evaluation		**1.1**

Source: Compiled by the authors according to the expert survey

to export and expand their market share. Moreover, the law explains the requirements for children's food production in Ukraine. Taking part in the interview, experts emphasized a vital role of food security of Ukraine because of European integration and import of European products. It is important to mention that Ukrainian producers of vegetable products for children do not have such a strong market position as European brands have. From this side, the Law of Ukraine «About food security of Ukraine» (The Law of Ukraine, n.d.) [23], which was not approved in 2012, might have strengthened the positions of domestic brands.

Nevertheless, while external producers have an opportunity to offer their products in Ukraine, a lot of Ukrainian producers have barriers in European markets because their food products do not meet the requirements of Codex Alimentarius and HACCP. Lack of international certificate centers and audit companies, unsigned agreements with Ministries of Commerce and Trades are supposed to be important reasons why Ukrainian producers of vegetable food for children do not have a current opportunity to be presented at European supermarkets. Moreover, experts point out that the Law of Ukraine «About quality and safety of food» influences economic relations between entrepreneurs in supply chains negatively (The Law of Ukraine, 2005) [25]. On the one hand, this law limits opportunities of suppliers of fresh vegetables since they have to follow rigid rules for storage and transportation. On the other hand, consumers of vegetables are not protected from unsafe ingredients in products for children, allowed in another assortment of vegetable products.

A group of economic factors has the biggest influences on vegetable children's food production (Table 3).

Tab. 3: **A group of economic factors in Macro environment (influence rate R = 0.15)**

Factor	An average estimation	Integer indicator
Opportunities		
Globalization children's food market	8	1.2
Demand elasticity in children's food market	8	1.2
Future opportunities for abroad sales of children's food	9	1.35
Total evaluation		**3.75**
Threats		
Low level of Ukrainian economic development	7	1.05
High bank interests	8	1.2
High inflation in the country	7	1.05
Rising unemployment of major consumers	6	0.9
Reduced purchasing power of mothers	9	1.35
Weak tax system	7	1.05
Unstable enterprises financial situation which produce children's food	8	1.2
The low level of imports of children's food	9	1.05
Low investment attractiveness of the vegetable industry	9	1.35
Total evaluation		**10.2**

Source: Compiled by the authors according to the expert survey

The majority of experts assert that nowadays the Ukrainian market of children's food has more economical cons than pros. High bank interests, the unstable financial situation, low levels of imports and external investments are supposed to be the main reasons why producers of children's vegetable food restrain production. About 80% of interviewed experts pointed out these factors as most essential and estimated this group from 8 to 10 points. According to the Ukrainian statistical review, imports of processing vegetables was 110.8 billion USD in 2016 (State statistics service of Ukraine, 2017a) and 45.9% of the results in 2013 (State statistics service of Ukraine, 2014) [26-27]. Producers reduced their abroad trade two-fold and sold an average 69.8 million USD of processing vegetables on the domestic market in 2016. This year marketing share of Ukrainian producers was 63.9% (State statistics service of Ukraine, 2017b, p. 8) [28]. While foreign direct investments were limited in food branches, total credits were more than $4 billion in 2016 (State statistics service of Ukraine, 2017c, p. 27) [29].

A rapid decline of purchasing power of mothers with children enhances a negative force for the foresaid factors. The government's one-time support of mothers for having a child a birth, for example, was 2989.8 USD (30*1176 UAH (living wage in 2014 [30])/11.8 per 1 USD [31]), 5979.7 USD (60*1176 UAH (living wage in 2014 [30])/11.8 per 1 USD [31]) and 11959.3 USD (120*1176 UAH (living wage in 2014 [30])/11.8 per 1 USD [31]) respectively for the first, second and each subsequent child until June of 2014. Currently, the one-time compensation for a woman is 1581.6 USD (41280 UAH/26.1 per 1 USD [32]) for every child (The Cabinet Decree, 2001 with amendments) [33]. This situation led to a reduction of a number of children born in Ukraine and a limitation of women's purchasing power. Traditionally, a lot of Ukrainian women make frozen, canned and dried vegetables by themselves at home, reducing demand for vegetable products from domestic producers.

Nevertheless, there are some positive forces which result in the further favorable development of the production of vegetable products for children. The conducted interviews show that customers search for a wide assortment of vegetables which they cannot produce, but need to buy for children, such as nutritious baby puree, rare vegetables for the region where a customer lives, purified spring water to be used for processing, etc. Some technological stages of these products might not be conducted in home conditions. These requirements make demand subject to changes of price and quantity.

It is unfair not to mention that the global market, estimated at 8 points, opens new opportunities for customers because it destroys barriers of geographical location. As hypothesized, in the literature review, the crucial advantage of globalization is the usage of the Internet recourses in order to buy necessity food, even for children. Plenty of women surf the Internet to research products at producer's websites, consolidate purchase through social networks, and order products online. To support interviewed experts and the influence of the Internet resources we used the serpstat.com website. We evaluated the karapuz.dp.ua website, which represents the Ukrainian brand Karapuz (karapuz.dp.ua, 2018) [34]. In February 2018 monthly total traffic is 2708 viewers since the site has 22 citing domains and 62 unique key phrases. The Internet provides the brand with additional benefits to inform customers, and to offer its vegetable products. What we were unable to account for, is that in the near future producers are ready to enter the European markets. Their opportunities are estimated to grow because producers need only time to update technologies and meet standard requirements.

We present the results of determined demographic factors in Table 4.

Tab. 4: **A group of demographic factors in Macro environment (influence rate R = 0.15)**

Factor	An average estimation	Integer indicator
Opportunities		
The growth of urban population	9	1.35
A significant proportion of economically active population (18-59 years)	7	1.05
Domain of female sex structure of the population	8	1.2
Total evaluation		**3.6**
Threats		
Reducing of population in the country	8	1.2
External migration	7	1.05
Decreasing of a birth rate	9	1.35
Uneven spatial distribution of the population	6	0.9
Reducing the level of life	5	0.75
Demographic aging nation	6	0.9
Total evaluation		**6.15**

Source: Compiled by the authors according to the expert survey

As of today, Ukrainians live in a quickly changing environment where urban territories are growing while villages are disappearing. According to Ukrainian population yearbook of 2016, only one new city has been created and 73 villages have been abandoned since 2012 (State statistics service of Ukraine, 2017d, p.13) [35]. Moreover, a ratio of urban and village population rose in the last five years and equals 2.08 in 2012 and 2.25 in 2016 (State statistics service of Ukraine, 2017d, p.15) [35].

Interviewed experts emphasize that this data represent a positive benefit for producers to increase their volume of foods because urban women tend to buy end-products in supermarkets, while rural women usually produce necessary vegetables themselves. Strong evidence is found in the interviews that gender structure results in an advantage changing the children's food market. Women are believed to make a decision about a brand or a product which should be chosen for their children's nutrition. Statistical research shows that there are 1159 females per 1000 males in Ukraine; so further communicative policy should be connected with women behavior (State statistics service of Ukraine, 2017d, p.16) [35].

Interviewed experts consider the reducing population and birth rate are essential demographic negative factors and estimate them at 8 and 9 points. We can support this idea, using statistical data. A birth rate is 397 thousand children in 2016 which is less than in 2012 by 124 thousand children (State statistics service of Ukraine, 2017d, p.41) [35]. Moreover, average 11.4 children were born to one thousand people in 2012, but in 2016 10.3 children were born to one thousand people. It makes the market share compress for production of vegetable foods for children. Further questions show that the other adverse factor is external migration when big families with children leave the country for a better life. For example, an annual rate of external migration has been 519 thousand people for the last three years (State statistics service of Ukraine, 2017d, p.115) [35]. The interview revealed that uneven location of a population requires producers to pay attention to the distribution system and supply chain management. But this factor, evaluated in 8 points, does not have significant influence. This confirms another negative factor that the demographic age of the Ukrainian population constantly increases. To sum it up, an analysis of demographic factors shows that since potential buyers and consumers of vegetable children's food is decreasing continually, and this market Ukrainian share will not widen in the next decade.

Further questions carried out with socio-geographic factors confirm our initial ideas. We present the factors in Table 5.

Tab. 5: **A group of socio-geographic factors in Macro environment (influence rate R = 0.05)**

Factor	An average estimation	Integer indicator
Opportunities		
Growing desire to supply domestic products	9	0.45
Traditional and cultural values of children's food consumption	9	0.45
Special attitudes of consumers to supply vegetables	7	0.35
Habits and a lifestyle of consumers	6	0.3
Increasing population, who prefer a healthy lifestyle	9	0.45
Religious requirements to food consumption	7	0.35
Social support of women with children	9	0.45
Total evaluation		**2.8**
Threats		
Low living standards	8	0.4
Belonging consumers to a certain social class	8	0.4
Limited consumption due to diseases of children	7	0.35
Total evaluation		**1.15**

Source: Compiled by the authors according to the expert survey

As influence rate of the socio-geographic group has the lowest level, the total integer indicator is 3.95 points. We suggest that both positive and negative changes in the social environment will not lead to a significant advance on the market of vegetable food for children. Advocates of health lifestyle claim that health should be grown from childhood. Therefore, a lot of followers among young mothers facilitate this idea, especially in Ukraine. They select product according to nutrient consistency, lack of harmful chemicals, and safe packaging. This factor has a maximal integer indicator in 0.45 points. The same estimation has other factors such as a desire to supply domestic products, traditional and cultural values of children's food and social support of women with children. These social approaches are strongly supported by Ukrainian horticulture business development project. And 6 from 8 experts highlight a significant role of the project in horticulture development in the southern regions of Ukraine.

Rural women are claimed to be consulted about requirements of organic production, a cold chain system and principles of health nutrition. Furthermore, after the revolution in 2013 the prestige of domestic production has increased, and plenty of mothers buy only domestic products in order to support their communities. If they pay for a product of a local producer, the taxes are directed to development of a community where this producer has registered his or her enterprise. Ukraine is a multicultural country where a lot of groups of different religions coexist. This implies that producers should pay attention to consumer preferences such as children pure. It is important to mention, that Muslims do not eat pork, while Jews do not mix milk and meat, and do not prepare vegetables that are contaminated with insects. It is very likely that these consumers might have completely refused consumption of all products of some brand, and this might have brought about changes in their preferences to this brand. The reason for this rather contradictory result is still not entirely clear; so, experts estimate religious impact at 7 points.

Therefore, careful attention must be exercised in people's variation by social classes and living standards. The interviewed experts point out that the higher wage a consumer has, the more valued products he or she selects. In contrast, consumers with lower wages prefer to buy food with lower price than higher quality. There is evidence to estimate these two factors at 8 points.

It is plausible that a few natural factors may have influenced the today development of the market for vegetable foods for children. We present the most significant impacts in Table 6.

The group of natural factors has a low total integer indicator as a socio-geographic factor because the influence rate of this group is only 0.05 points, even though some

Tab. 6: **A group of natural factors in Macro environment (influence rate R = 0.05)**

Factor	An average estimation	Integer indicator
Opportunities		
Sanitary standards to the physical and chemical composition of products	6	0.3
The possibility of non-waste production	9	0.45
The use of alternative energy sources in regions where food is produced	10	0.5
Total evaluation		**1.25**
Threats		
A limited number of fresh vegetables that meet standards to children's food production	9	0.45
Environment pollution after fertilizing fields of fresh fruits and vegetables	7	0.35
Specific hygiene requirements to production and processing	8	0.4
Vegetables as perishable products	9	0.45
The usage of adjuvant and flavors in production and storage	9	0.45
Total evaluation		**2.1**

Source: Compiled by the authors according to the expert survey

factors have a great impact on vegetable food production and its market. Today, renewable resources such as hydropower, biofuels, wind and solar energy are extremely important for various entrepreneurs and make production costs decrease. A usage of such types of energy will allow producing organic vegetable foods with an affordable price in the future. But the interviewed experts assert that renewable energy is not at the level of mass production, and takes only 3% of the total energy supply in Ukraine in 2016 (State statistics service of Ukraine, 2017e) [36].

Considering the high environmental pollution in Ukraine, approaches of the «Green economy» and sustainable production play a crucial role. From this side, a few producers of children's food use technologies of sustainable production.

As indicated by experts, the factor we explained leads to decreasing costs of maintenance and, consequently, costs of production. We highlight that minor part of entrepreneurs, who produce vegetables for children, have an opportunity to use renewable resources and technologies for sustainable production. This finding confirms the usefulness of the factor not only for today, but for the future.

Tab. 7: **A group of technological factors in Macro environment (influence rate R = 0.1)**

Factor	An average estimation	Integer indicator
Opportunities		
The usage of modern technologies in internal control and logistic monitoring	8	0.8
Innovative proposals of packaging	8	0.8
European technological standards to the production of children's food	9	0.9
Foreign investments into organic production	10	1.0
Total evaluation		**3.5**
Threats		
Slow growth of domestic innovation	9	0.9
Lack of state funding on scientific and technological development	9	0.9
Low efficiency of breeding work in research institutes	7	0.7
Obsolete technologies of production	9	0.9
The emergence of new technologies freezing and storage	10	1.0
Total		**4.4**

Source: Compiled by the authors according to the expert survey

Critically, the natural group has a lot of weak factors which cause debasement of end-products. Experts claim that producers should meet requirements to standards during all processes of production from delivery of fresh food to the end product displayed at supermarket shelves. To follow such rule of supply-chain management producers cannot use a list of chemical elements, adjuvant, and flavors when they offer foods for children. So, all experts estimate both factors as follows: «A limited number of fresh fruits and vegetables that meet standards to children's food production», and «The usage of adjuvant and flavors in production and storage» at 9 points, and they examine «Specific hygiene requirements to production and processing» at 8 points. The majority of the interviewed experts affirm that natural factors limit enterprises attempting to widen their assortment of children's food in overlying standard requirements. Experts who produce products for children claim that Ukrainian standards do not cover a variety of products which are presented at the global market.

While some producers are guided by standards, others benefit from advancing technological factors. We present the estimation of these factors in Table 7.

The group of technological factors has a significant impact on the children's vegetable food market, which is mostly negative. The threats of the group have 4.4 points of a total integer indicator while opportunities have only 3.5 points. The main reason is lack of renovated and modern facilities which Ukrainian producers may use in their technological process. The government does not fund and support any special scientific designs which are directed to production improvement in the children's food market. The interviewed experts emphasized as crucial implementing freezing in processing technology in order to meet the needs of consumers during out of season production periods. There is a significant positive result from freezing at the market because children benefit from consuming vitamins and other nutrients all year round, the demand for which is not satisfied, especially in winter. Probably, freezing technologies are claimed to be used by some producers, but this process requires additional chemicals, are not used for children's food. To sum it up, experts examined all said threats are present and evaluate them at 9 or 10 points.

Even though producers use obsolete maintenance, technological implementation has been improved in recent decades in some supply chains. Automatic quality control, load cells, and packaging are considered to be valuable internal elements of final product quality. Producers are extremely likely to use it in the main process to control a product's composition, measure packaging, and improve the marketable condition. As consumers do not pay a lot of attention to these aspects, experts suggest that the factors of logistic monitoring and innovative packaging should not be more than 8 points. Nowadays people's preferences to health and nutrition create a new share for an organic food market. Mothers search for fresh vegetables, processed food, and juices without chemicals. Affordable land costs and cheap labor attract foreign investments to fund and grow fresh organic vegetables. There was 410,6 thousand hectares of agricultural organic area in 2105 in Ukraine, so usage of fresh organic products is a crucial advance of the Ukrainian market in the near future (FAO, 2018) [37]. Consumers, producers, and investors will benefit from it. This explanation supports the consideration of experts to evaluate opportunities of organic production in 10 points.

We grouped examined factors, their integer indicators of threats and opportunities in order to evaluate a total indicator of factors influencing the macro environment (Table 8).

Tab. 8: **An integer indicator of the groups of the Macro environment**

Group	An integer indicator of opportunities	An integer indicator of threats	A total integer indicator
Politics and government state	1.0	1.1	-0.1
Economics	3.75	10.2	-6.45
Demography	3.6	6.15	-2.55
Socio-geography	2.8	1.15	1.65
Nature	1.25	2.1	-0.85
Technology	3.5	4.4	-0.9
Total integer indicator	**15.9**	**25.1**	**-9.2**

Source: Compiled by the authors according to the expert survey

6. Conclusions and discussions

According to the data, economic, demographic and socio-geographic factors are supposed to be the main forces influencing the vegetable children's food market of modern-day Ukraine. An absolute value of their total integer integrators is 6.45, 2.55 and 1.65. Our work has led us to conclude that only the socio-geographic factor has a positive effect among the others; so, to support the development of vegetables for children's food consumption, producers and government should accumulate forces and follow a new marketing strategy. In general, these results suggest that new alternatives will strengthen relations between producers and consumers. The findings of the study indicate that the main part of positive and negative factors, which have the integer indicator more than 1.0 point, locate in the economic group; so, crucial changes should be directed to this group. There is a strong probability that positive economic forces will drive to improvement of the Internet opportunities, even in villages where a lot of Ukrainians still do not make online purchases. If producers combined

opportunities of timely food logistics (a positive force of the technological group) and online sales of vegetables for children, they would increase purchasing power of rural consumers. By using alternative energy sources, producers can decrease their costs and compete with prices in the global market; so they will raise their export rate and stabilize their financial incomes.

Our research has underlined the importance of government support of vegetable food enterprises. An implication of this is a possibility to change the tax system for children's food production and support young mothers financially that do not have the possibility to consume a sufficient quantity of food. It is unfair not to mention that the state funding of engineering science will lead to renovated technological process.

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